CLAIMS

1.   (Withdrawn) Apparatus for providing distributed access control for load shaping in a computer system, comprising:

      shaper means for comparing payload class against class restriction status to alternatively permit access of payload to transport network or to defer access; and

      a credit allocation mechanism interconnected to said shaper means for allocating credits to class restriction status recorded in said shaper means.

2.   (Withdrawn) A method of bus activity BW (Bandwidth) management in a computer system for use by a plurality of BW managed and BW unmanaged entities wishing to transmit data over said bus, comprising:

      submitting a request, from a BW managed first entity, for a given bandwidth to an assignment entity;

      returning an assigned unique identity and a designated allowable BW from said assignment entity to said first entity;

      supplying said assigned unique identity and designated allowable BW from said assignment entity to a load shaping entity upon receipt, by said assignment entity, of acceptance of said BW by said first entity;

      sending data packets from said first entity to said load shaping entity for transmission on a bus attended by said load shaping entity, each of said data packets providing class priority information including said unique identity;

      reserving a number N of spaced apart time slots, commensurate with said designated BW, over a predetermined number of time slots, for use by said first entity for as long as said first entity continues to supply said data packets for transmission;

      maintaining a count of data packets processed over said predetermined number of time slots to prevent said first entity from accessing the bus more than N times in said predetermined number of time slots;

      resetting the count to a given value commensurate with N every predetermined number of time slots; and

permitting transmission of data packets over said bus by unmanaged entities when no
managed BW entity data packets await transmission.

3.   (Withdrawn) Shaper apparatus for use in connection with a bus request queue manager of a
data transfer system, comprising:

a plurality of counter mechanisms each operable to maintain a count of remaining managed
bus requests that are available for a given entity in a given operational period;

reset means for reinitializing each of said counter mechanisms each operational period;

table means for maintaining a record of entities authorized for managed data bus requests;

means for checking received bus requests against said table of entities authorized for
managed data bus requests;

means for checking an appropriate counter mechanism assigned to the entity presently
requesting bus access to determine if BW (Bandwidth) allocation authorized for said
entity has already been used in the present operational period;

means for enqueueing the presently received bus request for transmission when the check of
the counter mechanism provides an indication that the BW authorized for the present
operational period has not already been used; and

means for enqueueing the presently received bus request for delay to a later operational
period when the check of the counter mechanism provides an indication that the BW
authorized for the present operational period has already been used.

4.   (Withdrawn) Load shaper apparatus for use in connection with a multiplexed data transfer
system, comprising:

a plurality of counter mechanisms each operable to maintain a count of remaining managed
bus requests that are available for a given entity in a given operational period;

reset means for reinitializing each of said counter mechanisms each operational period;

first checking means operable to compare received bus requests with a list of entities
authorized for managed data bus requests;

second checking means operable to access an appropriate counter mechanism assigned to
the entity presently requesting bus access to determine if BW (Bandwidth) allocation

authorized for said entity has already been used in the present operational period; and

storage means operable to enqueue the presently received bus request for transmission when the check of the counter mechanism provides an indication that the BW authorized for the present operational period has not already been used and alternatively operable to enqueue the presently received bus request for delay to a later operational period when the check of the counter mechanism provides an indication that the BW authorized for the present operational period has already been used.

5. (Withdrawn) Load shaper apparatus for use in connection with a multiplexed data transfer system, comprising:

a plurality of reset-able time slot allocation tracking mechanisms each operable to maintain a count of remaining managed bus requests that are available for a given entity in a given operational period and which are reinitialized each operational period;

comparison means operable to ascertain when received bus requests are authorized for managed data treatment;

checking means operable to access an appropriate allocation tracking mechanism assigned to the entity presently requesting bus access to determine if BW (Bandwidth) allocation authorized for said entity has already been used in the present operational period; and

means operable to enqueue the presently received bus request for transmission when the check of the counter mechanism provides an indication that the BW authorized for the present operational period has not already been used.

6. (Withdrawn) Shaper apparatus for multiplex communication path access control in a computer system, comprising:

segregation means for sending path use requests that are not presently authorized for managed access to a best effort queue; and

deferring means for preventing present access to said communication path of a given authorized managed access request when it is determined that a predetermined BW (Bandwidth) of data has already been transmitted over the path during a present

operational period where different managed data requesters may have different authorized BW allocations.

7.   (Currently Amended) A [[S]]shaper apparatus for multiplex communication path access control ~~in a computer system~~, comprising:

a processing unit configured to request an amount of path bandwidth to be reserved for use by a first entity;

an operating system configured to:

determine whether the amount of path bandwidth is available to be reserved;

reserve the amount of path bandwidth for use by the first entity as a number of credits over an operational period;

assign a unique identity to the first entity; and

notify the first entity of the unique identity and the reservation of bandwidth;

notify a load shaper of the unique identity;

notify the load shaper of the reservation of bandwidth by informing the load shaper of the number of credits over the operational period reserved for use by the first entity; and

~~segregation means for removing path use requests that are presently authorized for managed access to a special queue; and~~

wherein ~~path access means operable~~the load shaper is configured to:

reset a counter to the number of credits at the beginning of a time frame, wherein the time frame has a length equal to the operational period;

receive a path use request from the first entity, the path use request comprising the unique identity;

~~provide access to said communication path of a given authorized managed access request when it is determined that a predetermined BW (Bandwidth) of data has not already been transmitted over the path during a present operational period where different managed data requesters may have different authorized BW allocations.~~

if the counter has at least one credit remaining, enqueue the path use request for transmission on a multiplex communication path; and

if the counter has at least one credit remaining, decrement the counter.

8.   (Currently Amended) A method of ~~managing access to a~~ multiplex communication path access control ~~in a computer system~~, comprising:

requesting, by a processing unit, an amount of path bandwidth to be reserved for use by a first entity;

determining, by an operating system, whether the amount of path bandwidth is available to be reserved;

reserving, by the operating system, the amount of path bandwidth for use by the first entity as a number of credits over an operational period;

assigning, by the operating system, a unique identity to the first entity;

notifying, by the operating system, the first entity of the unique identity and the reservation of bandwidth;

notifying, by the operating system, a load shaper of the unique identity;

notifying, by the operating system, the load shaper of the reservation of bandwidth by informing the load shaper of the number of credits over the operational period reserved for use by the first entity;

~~removing path use requests that are presently authorized for managed access to a special queue; and~~

resetting, by the load shaper, a counter to the number of credits at the beginning of a time frame, wherein the time frame has a length equal to the operational period;

receiving, by the load shaper, a path use request from the first entity, the path use request comprising the unique identity;

if the counter has at least one credit remaining, enqueuing, by the load shaper, the path use request for transmission on a multiplex communication path; and

if the counter has at least one credit remaining, decrementing, by the load shaper, the counter.

~~providing priority access to said communication path, of a given authorized managed access request, when it is determined that a predetermined BW (Bandwidth) of data has not already been transmitted over the path during a present operational period where different managed data requesters may have different authorized BW allocations.~~

9.   (Currently Amended) A computer program product for ~~managing access to a~~ multiplex communication path access control~~in a computer system~~, the computer program product embodied on a tangible computer readable medium~~having a medium with a computer program embodied thereon~~, the computer program product comprising:

computer code for requesting, by a processing unit, an amount of path bandwidth to be reserved for use by a first entity;

computer code for determining, by an operating system, whether the amount of path bandwidth is available to be reserved;

computer code for reserving, by the operating system, the amount of path bandwidth for use by the first entity as a number of credits over an operational period;

computer code for assigning, by the operating system, a unique identity to the first entity;

computer code for notifying, by the operating system, the first entity of the unique identity and the reservation of bandwidth;

computer code for notifying, by the operating system, a load shaper of the unique identity;

computer code for notifying, by the operating system, the load shaper of the reservation of bandwidth by informing the load shaper of the number of credits over the operational period reserved for use by the first entity;

~~computer code executed in the computer system for removing path use requests that are presently authorized for managed access to a special queue; and~~

computer code for resetting, by the load shaper, a counter to the number of credits at the beginning of a time frame, wherein the time frame has a length equal to the operational period;

computer code for receiving, by the load shaper, a path use request from the first entity, the path use request comprising the unique identity; and

computer code for, if the counter has at least one credit remaining, enqueuing, by the load shaper, the path use request for transmission on a multiplex communication path; and

computer code for, if the counter has at least one credit remaining, decrementing, by the load shaper, the counter.

~~computer code for providing priority access to said communication path, of a given authorized managed access request, when it is determined that a predetermined BW (Bandwidth) of~~

~~data has not already been transmitted over the path during a present operational period where~~ ~~different managed data requesters may have different authorized BW allocations.~~

10.   (Withdrawn) A computer program product for managing bus activity BW (bandwidth) management in a computer system for use by a plurality of BW managed and BW unmanaged entities wishing to transmit data over said bus, the computer program product having a medium with a computer program embodied thereon, the computer program comprising:

computer code for submitting a request, from a BW managed first entity, for a given bandwidth to an assignment entity;

computer code for returning an assigned unique identity and a designated allowable BW from said assignment entity to said first entity;

computer code for supplying said assigned unique identity and designated allowable BW from said assignment entity to a load shaping entity upon receipt, by said assignment entity, of acceptance of said BW by said first entity;

computer code for sending data packets from said first entity to said load shaping entity for transmission on a bus attended by said load shaping entity, each of said data packets providing class priority information including said unique identity;

computer code for reserving a number N of spaced apart time slots commensurate with said designated BW, over a predetermined number of time slots, for use by said first entity for as long as said first entity continues to supply said data packets for transmission;

computer code for maintaining a count of data packets processed over said predetermined number of time slots to prevent said first entity from accessing the bus more than N times in said predetermined number of time slots;

computer code for resetting the count to a given value commensurate with N every predetermined number of time slots; and

computer code for permitting transmission of data packets over said bus by unmanaged entities when no managed BW entity data packets await transmission.

11.   (Withdrawn) A method of queuing data packets for transmission from a source to a target over a multiplexed communication path, comprising:

checking received data packets to ascertain whether they belong to a managed class;

placing data packets in a first queue for transmission on a best efforts basis;

checking remaining data packets ascertained to be in a managed class to determine if they originate from a source that is presently authorized to be managed;

placing data packets, determined to have no present authorization to be managed, in said first queue for transmission on a best efforts basis;

checking remaining data packets, determined to presently be authorized for management, to ascertain if BW (Bandwidth) authorized for the source of the data packets has been exceeded for the present operational time period; and

placing data packets, determined to have present authorization to be managed and to have BW remaining in the present operational time period in a second queue unique to that class source of data, said second queue having priority over said first queue.

12.   (Withdrawn) The method of claim 11, comprising, in addition:

placing data packets, determined to have present authorization to be managed and to have no BW remaining in the present operational time period in a delay queue for transmission in a later time period.

13.   (Withdrawn) The method of claim 11, comprising, in addition:

maintaining a count of the number of managed data packets transmitted by a given presently authorized managed data source in a given operational time period as a way of ascertaining BW; and

reinitializing the count each operational time period.

14.   (Withdrawn) Apparatus for selectively queuing data packets for transmission from a source to targets over a multiplexed communication path, comprising:

means for checking received data packets to ascertain whether they belong to a managed class;

means for placing data packets in a first queue for transmission on a best efforts basis;

means for checking remaining data packets ascertained to be in a managed class to determine if they originate from a source that is presently authorized to be managed;

means for placing data packets, determined to have no present authorization to be managed, in said first queue for transmission on a best efforts basis;

means for checking remaining data packets, determined to presently be authorized for management, to ascertain if BW (Bandwidth) authorized for the source of the data packets has been exceeded for the present operational time period; and

means for placing data packets, determined to have present authorization to be managed and to have BW remaining in the present operational time period, in a second queue unique to that class source of data, said second queue having priority over said first queue.

15. (Cancelled)

16. (Currently Amended) The method of [[C]]claim 8, wherein the multiplex communication path is a bus, and further comprising:~~the managing access comprises a step of monitoring activity BW (Bandwidth) for use by a plurality of BW managed and BW unmanaged entities wishing to transmit data (data packets) over said bus, and wherein the monitoring activity further comprises steps of:~~

receiving, by the load shaper, a second path use request from a second entity, wherein path bandwidth has not been reserved for use by the second entity; and

enqueuing, by the load shaper, the second path use request for transmission on the multiplex communication path in a best efforts manner.

~~checking received data packets to ascertain whether they belong to a managed class;~~

~~placing data packets in a first queue for transmission on a best efforts basis;~~

~~checking remaining data packets ascertained to be in a managed class to determine if they originate from a source that is presently authorized to be managed;~~

~~placing data packets, determined to have no present authorization to be managed, in said first queue for transmission on a best efforts basis;~~

~~checking remaining data packets, determined to presently be authorized for management, to ascertain if BW (Bandwidth) authorized for the source of the data packets has been exceeded for the present operational time period; and~~

~~placing data packets, determined to have present authorization to be managed and to have BW remaining in the present operational time period in a second queue unique to that class source of data, said second queue having priority over said first queue.~~

17.   (Currently Amended) The method of claim ~~16~~8, further comprising:~~comprising, in addition:~~

~~placing data packets, determined to have present authorization to be managed and to have no BW remaining in the present operational time period in a delay queue for transmission in a later time period.~~

if the counter does not have at least one credit remaining, delaying, by the load shaper, the path use request until a next time frame.

18.   (Cancelled)

19.   (Currently Amended) The computer program product of [[C]]claim 9, wherein the multiplex communication path is a bus, and further comprising:~~and the managing access is managing bus activity BW (bandwidth) in the computer system for use by a plurality of BW managed and BW unmanaged entities wishing to transmit data over said bus;~~

computer code for receiving, by the load shaper, a second path use request from a second entity, wherein path bandwidth has not been reserved for use by the second entity; and

computer code for enqueuing, by the load shaper, the second path use request for transmission on the multiplex communication path in a best efforts manner.

~~computer code for submitting a request, from a BW managed first entity, for a given bandwidth to an assignment entity;~~

~~computer code for returning an assigned unique identity and a designated allowable BW from said assignment entity to said first entity;~~

~~computer code for supplying said assigned unique identity and designated allowable BW from said assignment entity to a load shaping entity upon receipt, by said assignment entity, of acceptance of said BW by said first entity;~~

~~computer code for sending data packets from said first entity to said load shaping entity for transmission on a bus attended by said load shaping entity, each of said data packets providing class priority information including said unique identity;~~

~~computer code for reserving a number N of spaced apart time slots commensurate with said designated BW, over a predetermined number of time slots, for use by said first entity for as long as said first entity continues to supply said data packets for transmission;~~

~~computer code for maintaining a count of data packets processed over said predetermined number of time slots to prevent said first entity from accessing the bus more than N times in said predetermined number of time slots;~~

~~computer code for resetting the count to a given value commensurate with N every predetermined number of time slots; and~~

~~computer code for permitting transmission of data packets over said bus by unmanaged entities when no managed BW entity data packets await transmission.~~

20.   (Currently Amended) The shaper apparatus of claim 7<u>, wherein the load shaper is further configured to:</u>~~further comprising~~

<u>determine the path use request is from an entity which path bandwidth has been reserved for.</u>

~~means for comparing payload class against class restriction status to alternatively permit access of payload to the multiplex communication path or to defer access; and~~

~~a credit allocation mechanism interconnected to said shaper apparatus for allocating credits to class restriction status recorded in said shaper apparatus.~~

21.   (Currently Amended) The shaper apparatus of claim 7, wherein the multiplex communication path is a bus, and <u>wherein </u>the ~~shaper apparatus~~<u>load shaper</u> is further<u> configured to</u> ~~comprising~~:

<u>if the counter does not have at least one credit remaining, enqueue the path use request for delay until a next time frame.</u>

~~a plurality of counter mechanisms each operable to maintain a count of remaining managed bus requests that are available for a given entity in a given operational period;~~

~~reset means for reinitializing each of said counter mechanisms each operational period;~~

~~first checking means operable to compare received bus requests with a list of entities authorized for managed data bus requests;~~

~~second checking means operable to access an appropriate counter mechanism assigned to the entity presently requesting bus access to determine if BW (Bandwidth) allocation authorized for said entity has already been used in the present operational period; and~~

~~storage means operable to enqueue the presently received bus request for transmission when the check of the counter mechanism provides an indication that the BW authorized for the present operational period has not already been used and alternatively operable to enqueue the presently received bus request for delay to a later operational period when the check of the counter mechanism provides an indication that the BW authorized for the present operational period has already been used.~~

22. (Cancelled)

23. (Cancelled)

24. (New) The computer program product of claim 9, further comprising:

computer code for, if the counter does not have at least one credit remaining, delaying, by the load shaper, the path use request until a next time frame.

25. (New) The shaper apparatus of claim 7, wherein:

the multiplex communication path is a bus;

the first entity is a computer application processed by the processing unit;

the first entity is in a computer system; and

the path use request comprises a request to transmit a data packet to a device in the same computer system as the first entity.

26. (New) The method of claim 8, wherein:

the multiplex communication path is a bus;

the first entity is a computer application processed by the processing unit;

the first entity is in a computer system; and

the path use request comprises a request to transmit a data packet to a device in the same computer system as the first entity.

27.   (New) The computer program product of claim 9, wherein:

the multiplex communication path is a bus;

the first entity is a computer application processed by the processing unit;

the first entity is in a computer system; and

the path use request comprises a request to transmit a data packet to a device in the same computer system as the first entity.